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Contribution on Cow Sterility*

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The incidence of bovine sterility in dairy herds in many European countries amounts to 15 to 35 per cent., causing an annual loss of millions of pounds [H. Fox (1941) assesses the wastage in Great Britain in 1938 at £3,504,279]. In addition to the direct financial loss, sterility often ruins the work of breeders of many years standing.

Poland is an important cattle breeding country; in North-Western Poland, called Great Poland†, the cattle are almost exclusively the Black-White (Friesian crossed with Oldenburg). In this region there is not much pasture and the large number of dairy cows are kept throughout the year under conditions which are physiologically abnormal. Many of the best herds are kept in byres all the year round; and the health and reproductive capacities of the dairy cow are being sacrificed to record milk yields. In these circumstances the frequency of sterility must be high, and is estimated to be 15 to 18 per cent. annually for the total breeding stock.

Naturally, most of the cases are of temporary sterility (the number of cows remaining permanently sterile is small) but the farmers cannot afford to keep the cows dry for long periods. Several years before the war a systematic campaign against sterility in dairy herds was begun in certain districts through Agricultural Chambers and Unions of Cattle Breeders. Its initial success was effected by good organisation, but it depended on the goodwill, full understanding and collaboration of the farmers and veterinary surgeons, without any pressure of government administration and bureaucracy. The voluntary co-operation of the careful, business-like farmer and the modern veterinary surgeon is the best means to combat bovine sterility.

Aetiology and Pathogenesis

Aetiology of sterility is hazy and depends on genetical, anatomical, physiological, endocrinal, nutritional, pathological, metabolic and environmental factors. It is generally agreed, that cow sterility is definitely highest in dairy herds kept under more intensive, modern systems of management. In the reasonably well-managed dairy herd, where cows are not forced for highest production and are given exercise, pasture, fresh air, sunlight, green and healthy natural foods, barrenness in cows is not a common occurrence.

The variations in individual reproductive capacity ranging between normal fertility and pathological sterility are due to a multiplicity of aetiological factors and may be conveniently classified under the heading, "Impaired Fecundity" or "Fluctuating Fertility."

Heredity must undoubtedly play some part in the question of infertility (genes lethal and semi-lethal) and for that reason the calves by sires with "impaired fecundity," as well as those with inborn sexual defects are soon recognised and removed from further breeding.

The classification and consideration of the causes, especially of the temporary cow sterility, is very difficult because to distinguish the proper, essential, chief and primary factors from subsequent, secondary, accessory, occasional and accidental incidences, which are very different, is often impossible (*see Table*)—since in some biological transformations there is not a definite line between normal (physiological) and the abnormal (pathological) phenomena; there are numerous cases of cow sterility in which no pathological causes can be found and consequently essential causes are unknown.

At present the precise mechanism of ovulation in the cow and moreover the abnormal and pathological defects in the ova closed and discharged from the follicle are not well-known. Many cases of infertility arise only from ignorant help at copulation (false copulation) in spite of full fecundity in the cow and in the bull. In old cows with pendulous abdomen the vaginal passage is sometimes pulled downwards and forwards and this may interfere with the passage of the penis.

* Dedicated to the Royal (Dick) Veterinary College in Edinburgh, as a mark of appreciation of the hospitality extended to the author—a Polish "refugee" professor—and of the facilities so readily accorded him for the prosecution of his researches.

† The author has no precise data on cow sterility in all Poland, he mentions only the North-West because he worked in this region for over 20 years.

CLASSIFICATION OF THE CAUSES OF COW STERILITY

Sterility	A. Permanent	I. Congenital (Hereditary) (Primary)	1. Genetal factors and anatomical abnormalities in the female genitalia		Lethal genes
					Lack of or defects in the ova
					Heterosexual twins ("Freemartins")
					Individuality ("Impaired fecundity")
					Monstrosities (teratogical congenital changes)
					Hermaphrodites (intersexuality)
					Aplasia or hypoplasia of one or more sexual organs (infantilisms)
					Deviations (flexiones), congenital, in the uterus
					Atresia, congenital, Fallopian tube, canalis cervicis uteri, vulvae (hymen persistens)
					Large, ballooned vagina, congenital
	or	or	1. Non-infectious factors	(*a*) Physiological	Endocrinal: Irregularity in oestrus (anaphrodisia, nymphomania)
					Nutritional: Dietetic errors—avitaminosis
					Metabolic: Toxicosis, anoxemia, osteomalacia
					Environmental: Intensive management—intensive mammary activity
	B. Temporary	II. Acquired (Consecutive) (Secondary)		(*b*) Pathological	Ovarian cysts, corpus luteum persistens
					Oophoritis, salpingitis, endometritis traumat.
					Cervicitis, spasmus canalis cervicis
					(Foetus papyraceus—calcinaceus)
					Atresia canalis cervicis, vulvae acquisita
					Vaginitis (non-infectious), ruptura vulvae
					Fistula recto-vaginalis
					Genital tumours
			2. Infectious factors and diseases	(*a*) Specific	Trichomoniasis, brucellosis, tuberculosis, paratuberculosis, vaginitis (glandular infection)
				(*b*) Non specific	Endometritis puerperalis, pyometra, physometra, infectious mammary diseases
			3 Causes unknown (no pathological cause can be found)		

The sterility of the bull and the infectious specific causes of sterility, such as brucellosis, trichomoniasis, tuberculosis, etc., constitute a separate problem which must be afforded a special paper and which is not included here.

Nutritional research, development of plant-hormone substances, auxines, enzymes, provitamins and vitamins, called endohormones, and synthetisation of some of the vitamins have thrown fresh light upon many obscure problems of animal feeding and have now enabled the progressive farmer to keep his dairy herd on scientifically balanced diets. It is possible to associate the excessive use of prepared foods, deficient in plant-hormones, with a deficiency of hormone production in animals (exohormones) subsisting on them. This factor is very important as an adjunct for the support of fertility. Unfortunately, we do not know the details of the transubstantiation of endohormones and exohormones. In practice, we order the breeder to turn the cows out to grass or to add into meal different plants or preparations which are rich in vitamins, especially in vitamin E.

Under the unnatural conditions in Great Poland, the farmers were recommended to add oat germ to the meal, especially in winter. Though empirical, this led in practice to good results. The breeder in Great Poland often feeds enormous quantities of soya-beans, palm-kernel, beet leaves and other fodder, which have a very different nutritive value in the animal body and sometimes cause grave poisoning and anaemia (nutritional anaemia, anoxaemia) and also different deficiency diseases (mineral deficiency, protein deficiency, avitaminosis).

In one large farm with 320 cows in Great Poland I found in 1934, 82 per cent. of the cows temporarily sterile following on improperly balanced rations of soya-bean and palm-kernel. In other cases the temporary sterility appeared as a result of excessive feeding on beet leaves. After stopping this unnatural method of feeding, the fertility returned.

A deficiency of protein in a ration causes the animal to draw upon its supply of body protein for its normal body functions, whilst the ration thus becomes unbalanced and the digestibility of other ingredients of the food is reduced. But the dairy cow suffers also from an excess of protein in the ration, which is not only expensive in the long run, but also upsets digestion, whilst much of the excess food is wasted by being passed without a proper metabolism, thus leading to digestive derangements, kidney trouble and general laziness, which cause irregularity in heat and often temporary sterility.

The physiological importance of adequate exercise to the blood and lymph circulatory systems, to respiration, digestion, skeletal muscle tonus, and so on and consequently to the whole organism is already well-known. In this respect the thoughtless housing under rather a " prison " system is indisputably reprehensible.

From the clinical and therapeutical points of view, the most important causes of cow sterility which it is necessary to mention are :—

1. Hypertrophied udder (intensive mammary activity).
2. Abnormalities in the normal sexual cycle (irregularity in oestrus, anaphrodisia, nymphomania).
3. Pathological changes in uterus (cervicitis, metritis-pyometra, physometra, hydrometra).

I.—Hypertrophied Udder (*Intensive Mammary Activity*)

Many dairy cows suffer from anatomical and functional mammary hypertrophy as a result of intensive mammary activity. The physiological function of the mammary glands depends upon a corresponding function of the genital organs ; the secretory cells of the mammary acini receive a galactophoric hormone—prolactin—likewise produced from the anterior pituitary lobe. Weigert's rule declares that the overworked or pathologic organ reduces the productiveness or increases the pathologic function in the other related organ. Hypertrophy is a pathological change. The anterior pituitary cannot become equally as hypertrophied as the udder, because of its anatomical situation. Its tissues are concerned with the elaboration of other gonadotrophic hormones and in the absence of any possibility of becoming hypertrophied, it is logical to postulate that when a demand for excessive prolactin production occurs from a highly developed udder, the production of gonadotrophic hormones may be embarrassed (W. C. Miller, 1939).

The studies of Graham, Kay and McIntosh, Hammond (1936), Selye, Folley and Young, Scott, Watson, Bottomley *et al.* (1940, 1941) give the best idea of a great correlation between the gonadotrophic hormones and prolactin from anterior pituitary lobe and other endocrinal glands. The adrenals and the thyroid also play a part in the maintenance of milk secretion, perhaps indirectly through their effect on general metabolism. If to these physiological factors is added the pathological incidence, then the complex is so involved that the organism resists through the debility or the restraint of the function of the genital organs, because the secretion of milk is in strict conjunction with fecundation and its result.

Thus we conceive, while the best dairy cows are not useful for long, they are very sensitive to all kinds of diseases and infections not only of the mammary glands but often reveal abnormalities in the normal sexual cycle, are nervous, hysterical or apathetic and soon perish from general exhaustion and inanition in spite of more or less good external appearance.

The farmer should remember that the increase of milk production in cows is due to develop by slow biological evolution. Artificially created intensive mammary activity evoking strong anatomical and functional mammary hypertrophy is a pernicious biological error, which ruins not only the mammary glands but the whole organism and specially the related sexual organs.

II.—Abnormalities in the Normal Sexual Cycle

(*a*) *Irregularity of Oestrus*

Abnormalities in the normal sexual cycle are very often regarded as a primary or consecutive cause of sterility.

The normal ovarian cycle consists of two phases, the maturation and rupture of one or more Graafian follicles, and the subsequent development of a corresponding number of corpora lutea. The first of these phases is correlated with the libido sexualis to accept the male, and the second with the changes characteristic of early pregnancy. The physiological definite cyclical changes of oestrus are :—

1. *Dioestrus* or period of rest. In this period the ovaries are inactive. The Graafian follicles are not developed. The mucous secretion from the vagina is scanty and contains well-nucleated epithelial cells and a few leucocytes. This stage lasts about seven to eight days and is followed by
2. *Pro-oestrus* in which the Graafian follicles undergo development. The mucous secretion from the vagina increases and contains degenerated, more cornified, epithelial cells and an increasing number of leucocytes. The uterus begins to enlarge. This lasts about two to three days and is followed by
3. *Oestrus* or heat, at which period the ripe ovum is shed from the Graafian follicle. The uterine glands are active and secrete much mucus. The mucous secretion from the vagina also is abundant and contains cornified non-nucleated epithelial cells (flakes) and large numbers of leucocytes. The external genitalia are enlarged, oedematous and congested. This stage is short and lasts about one to two days, and is followed by
4. *Met-oestrus* in which the epithelial cells remaining in the ruptured Graafian follicle undergo a rapid hypertrophy and became converted into luteal cells of the corpus luteum. The mucous secretion from the vagina is reduced and contains again more or less well-nucleated epithelial cells from the superficial vaginal epithelium and a few leucocytes. The blood vessels and glands of the uterine mucosa become very active and the whole uterus increases in size. This stage lasts about eight to nine days, and the whole cycle is then repeated, taking an average of 20 to 21 days (*see Diagram* I).

There are thus well-marked rhythmic changes taking place in the ovaries, uterus and vagina, which must be co-ordinated if the sexual cycle is to follow its normal course and successful fertilisation of the ovum is to take place (J. A. Nicholson, 1939).

It is possible to estimate from rectal palpation the size of the ovaries, Graafian follicles, corpus luteum, Fallopian tube and uterus.

During anoestrus the ovaries are small and oval, approximately 3 to 4 cm. long, 2 cm. deep and 2 to 3 cm. wide ; at this time the ovaries are hard to the touch and the surface is quite even.

During pro-oestrus usually one Graafian follicle larger than the others can be palpated.

During oestrus one Graafian follicle gradually matures to ovulation size, which varies from 0·8 to 1 cm. and as this Graafian follicle matures, the others, which started to develop, decrease. While the Graafian follicle is maturing it feels tense and firm (but is easily cracked by a touch). Immediately after ovulation, the collapsed walls of the Graafian follicle feel soft and flabby and an indentation can be felt on the surface of the ovary. Within the next few hours, the collapsed walls of the Graafian follicle fill with blood and at this stage the ovary feels spongy. In the next 24 to 36 hours there is gradual hardening of the freshly formed corpus luteum, which is more or less distinct on the surface of the ovary.

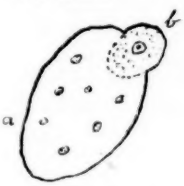
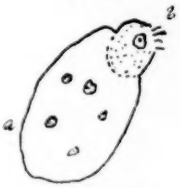
Physiological research has shown that the mechanism of the oestrus cycle consists of inter-relation between two internal secretions of the anterior pituitary lobe, prolan A and B and two ovarian secretions, oestrone (also oestrin, folliculin) and progesterone (lutenin) produced from the Graafian follicle and corpus luteum, respectively.

The Graafian follicle-stimulating fraction—prolan A—causes the Graafian follicle to increase in size and ripen, and the luteinising hormone—prolan B—causes ovulation and the formation of corpus luteum from the granulosa of the Graafian follicle. Between prolan A and prolan B there is, it seems, only quantitative and no qualitative

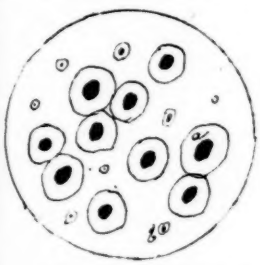
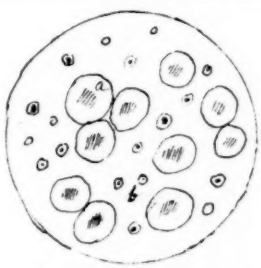
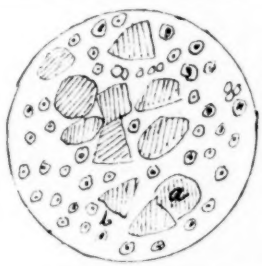
DIAGRAM 1

SCHEME OF NORMAL SEXUAL CYCLE IN COW

Rhythmic Changes in the Ovaries

Di-oestrus	*Pro-oestrus*	*Oestrus*	*Met-oestrus*
			
a = Ovary inactive. *b* = Graafian follicle small.	*b* = Graafian follicle developed and large.	*b* = Graafian follicle ripened and ruptured.	Ruptured Graafian follicle converted into luteal cells of *b* = the corpus luteum.
Mucus in the vagina scanty. Uterine glands inactive.	Mucus in the vagina increases. Uterus begins to enlarge and its glands active.	Mucus in the vagina abundant. Uterine glands active.	Mucus in the vagina reduced. Blood vessels and glands of the uterus very active.

Microscopic Pictures of Vaginal Smears

			
a = Nucleated epithelial cells. *b* = Few leucocytes. 7-8 days	*a* = Epithelial cells with nucleus degenerated. *b* = Leucocytes increasing. 2-3 days	*a* = Non-nucleated epithelial cornified flakes. *b* = Large numbers of leucocytes. 1-2 days	*a* = Normal vaginal epithelial cells. *b* = Epithelial cells with nucleus degenerated. *c* = Few leucocytes. 8-9 days

20-21 days

difference and this classification suggests that these are purely hypothetical substances.

Under the influence of prolan A, the Graafian follicle ripens and the ovary produces oestrone (folliculin, oestrin), which evokes the symptoms of oestrus. The origin of oestrone is still obscure. A substance with oestrogenic properties has been isolated from the urine of pregnant women and mares in large quantities (the urine of pregnant cows contains only uncertain small quantities) and, what seems curious, from the urine of young stallions in large quantities, and in insignificant quantities in human tears, in buds and blossoms in the trees and even in coal (Skarzynski, 1933).

It has been suggested that oestrone (folliculin) antagonises or neutralises in some way the action of gonadotrophic hormone (fraction —prolan A).

Progesterone (lutenin) has been isolated in a pure state, and its chemical properties are known. Progesterone inhibits further Graafian follicles from ripening, neutralises, or in some way prohibits, action of oestrone, causes the proliferation of the uterine mucous membrane and also development of the mammary gland, (Robson, 1940). Progesterone is a purely female hormone, whereas gonadotrophic hormone, oestrone and so-called male hormone, testosterone, are ambisexual (*see Diagram 2, overleaf*).

(*b*) *Anaphrodisia and Nymphomania*

If for some reason not yet known the inter-relation between gonadotrophic and ovarian hormones is disturbed, the cow may appear to have ovarian inactivity, anaphrodisia (anoestrus), or ovarian hyperactivity (nymphomania).

Under the influence of the luteinising hormone (prolan B), the corpus luteum remains active until about the 19th day of the cycle, when it begins to atrophy and the new Graafian follicle begins to ripen. If the ovum is fertilised, more prolan B is produced, and the corpus luteum does not atrophy at the end of 19 days, but remains throughout pregnancy (corpus luteum graviditatis). For some reason at present unknown, the corpus luteum occasionally remains even though the cow is not pregnant (corpus luteum persistens); the cow does not show signs of oestrus for many months (anaphrodisia).

When the Graafian follicle is ripe under the influence of prolan A, and prolan B is not secreted from the anterior pituitary lobe, ovulation does not occur and then either the ripe Graafian follicle augments exceedingly and forms a large cyst or other Graafian follicles may ripen without enlarging and form a number of small cysts in the ovary (J. Hammond, 1939). In the former case the cow fails to have oestrus (anoestrus, anaphrodisia) and in the latter (degeneratio cystica ovarii), the symptoms of oestrus appear every few days as each Graafian follicle ripens (nymphomania).

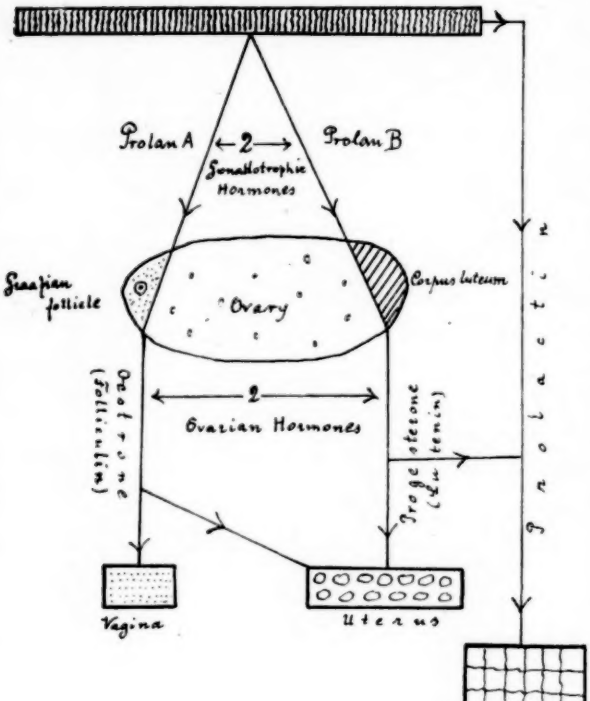
Anaphrodisia and Nymphomania.—These are not exactly definite pathological conditions or diseases of the anterior pituitary or ovary but synonyms for the symptoms of irregularity in the normal sexual cycle provoked by the disturbance in the level of the secretion of sexual hormones.

This disturbance can be provoked directly by pathological conditions of the anterior pituitary and ovary or indirectly by different diseases and sepsis elsewhere in the genitalia.

These ovarian irregularities appear also in some cases of infertility in which no pathological causes can be found, as only a psychological symptom.

DIAGRAM 2

SCHEME OF SEX HORMONIC INTER-RELATIONSHIP



Anaphrodisia appears more rarely and mostly in young individuals (in my cases in about 24 per cent.), especially in winter time in heifers which are too fat.

Nymphomania appears more often in adult cows, also as a secondary symptom of different abnormalities, diseases and sepsis in different segments of the genital tract. (In my cases in about 76 per cent.).

III.—Pathological Changes in the Uterus

Salpingitis (inflammation of the Fallopian tubes) is associated with pyometra and is often bilateral, rarely unilateral, as is recognisable on rectal examination. Often salpingitis can be tuberculous and the infection has usually spread from a tuberculous peritonitis.

Cervicitis is the most frequent specific lesion of the genital tract of sterile cows. It may be present alone or associated with vaginitis, metritis or salpingitis.

The majority of barren cows suffer from endometritis and metritis. Owing to the prevailing conditions, particularly if the foetal membranes are retained, there is soon an enormous bacterial flora, which is responsible for the endometritis chronica. I had estimated that in North-Western Poland nearly 16 per cent. in a herd may be found to be suffering from pyometra with or without pathological changes in the ovaries.

Even a very small amount of pus in the uterus may prevent oestrus for months or years. The bacteria most frequently found are: streptococci, diplococci, *B. pyogenes*, *B. coli*, *Brucella abortus* infection and mixed infection. There are also some cases in which the contents are sterile. The fluid contents of the uterus varied from 1 to 40 litres and more, but were commonly 8 to 10 litres. In many cases the amount of fluid is very insignificant but the uterus contains a great amount of inodorous or putrid gases (physometra).

Other pathological changes in the genital tract are: deviations (flexioris) uteri, tumours of various kinds, diseases of the vagina (vaginitis vesicularis and granularis infectiosa), fistula recto-vaginalis, adhesions of the vulva and vagina, ruptura vulvae; these are not infrequent causes of sterility.

Diagnosis of Early Pregnancy

The veterinary surgeon engaged in treating sterility should, first of all, have an exact knowledge of the clinical methods of diagnosis of early pregnancy; these demand great practical experience.

The early subjective signs of pregnancy in the cow are, however, often misleading and the farmer cannot rely upon sexual behaviour as one of them. The available methods of diagnosing early pregnancy in cows are not numerous. Blood, serum, urine test (methods of Aschheim-Zondek, Friedman and their modifications), and Cuboni's chemical test, which are applicable in mares with good results, are not applicable in cows. Other tests are doubtful, such as the old Indian method of placing a drop of milk on water, that of Abderhalden, an interferometric test, and Kosiakow's recent chemical test of hair, which Runge (1939) has shown to be non-specific. It is hoped that a modification of Fall's method* may prove satisfactory.

At my institute in the University in Poznan, Dr. S. Jankowski, v.s., examined the mucin of pregnant cows. The diagnosis is based on the fact that in pregnant cows the vaginal and cervical secretions become viscous and sticky in character, whereas in barren cows, it is thin and fluid. The amount and stickiness of the secretion in the vagina increases with the advance of pregnancy. The microscopic appearance of cervical smears is different. A brush is inserted into the vagina, then withdrawn and the mucous secretion is spread over the surface of a clean microscopic slide, fixed with alcohol, dried and stained with Delafield's haemotoxylin for one minute or in 1 per cent. aqueous methylene blue, rinsed with water, dried and examined. The pregnant smears under half or higher objective show distinct globules of mucus and large numbers of the so-called "pregnancy cells" which are columnar epithelial cells and flakes and perhaps a small proportion of leucocytes. The mucin test gives positive results as early from the end of the fourth week of pregnancy in cows. Its accuracy increases as pregnancy advances, being most effective after 60 to 70 days. The mucin test in cows may be employed only as an additional test in conjunction with clinical, rectal and vaginal exploration in the diagnosis of early pregnancy.

These clinical methods are of the greatest practical importance. Pregnancy is recognisable by rectal palpation in the cow, within 30 to forty days after conception. Prior to this time it is very difficult to palpate the foetus and diagnosis is very doubtful so that the veterinary surgeon must take into consideration two signs of early pregnancy: (*a*) *Cessation of oestrus after copulation.* This sign is reliable only in those cows in which oestrus has been regular and normal. In 1 to 3 per cent. of pregnant cows, heat may occur regularly or irregularly usually in the third or fourth month of pregnancy but in some exceptional cases also in later months. (*b*) *The vaginal and cervical secretion.* In the non-pregnant cows there is a normal secretion of lubricant mucus in small (5 to 10 c.c.) amounts. During oestrus the amount of mucus becomes enormously increased a it flows from the vulva. Within 30 to 40 days after conception, the mucus of the vagina is decreased in amount, ceases to be lubricant and becomes adhesive. In the cervical canal, especially in the cow, takes place a new type of secretion of tough gelatinous consistency, which fills the firmly closed cervical canal.

The vaginal and cervical mucus can be palpated *per vaginam* and also by visual examination with the aid of a speculum and afterwards microscopic examination (see above). But the diagnosis of early pregnancy is chiefly by rectal palpation, as by it may be recognised not only gestation but also its separate periods, of which I distinguish six.

Period I. From 30 to 60 Days (1 to 2 *Months*).—In this time the uterus undergoes prompt and marked changes in volume, form, consistence and situation, but the condition is more notable in heifers than in the cows which have previously calved. Except in the case of twin pregnancy, usually the right horn of the uterus is pregnant and is larger than the left horn. The uterus is smooth and even in outline, firm, tense and fluctuating, because the broad ligaments do not yield. At the region of the promontorium (the internal os uteri), the superior uterine wall of the cow rises up suddenly like a terrace. The firmness of the uterine wall exhibits to the touch a sense of vigour and life. The walls are tense and the foetal fluids are quite recognisable as such in seven to eight weeks and sometimes cotyledons are palpable through the uterine wall. Although the foetus acquires a length of rather more than 3·5 to 4 cm. towards the 28th day, it is very difficult to touch. The recognition of foetal fluids and cotyledons in this period demands great practical experience. Towards the 49 days the length of the foetus is 4 to 6 cm.

The bovine corpus luteum of pregnancy is normally 1 to 1·5 cm. in diameter, somewhat oval in form, usually even in contour and firm in consistency. At exploration about 18 to 21 days after copulation, if the cow is pregnant, there is present a typical corpus luteum of pregnancy; if she is not pregnant, the corpus luteum is small. When

* *Canad. J. Comp. med. vet. Sc.*

a typical corpus luteum of pregnancy is present and other findings are in accord, the evidence afforded by the corpus luteum is of great value.

Period II. From 61 *to* 90 *Days* (2 *to* 3 *Months*).—In this period additional palpable evidence appears. The uterus becomes distinct and characteristically enlarged. The foetal fluids and cotyledons are easily palpable, but the foetus cannot so easily be palpated, although towards the 12th week it is 15 to 16 cm. long. The corpus luteum is distinct.

Name of Owner of Herd. Full Address.

Current number.	Name, age or number of cow.	Date of the last			Dates of examinations.	Pathological changes in the sexual organs.	Diagnosis	Treatment.	Remarks.
		Birth.	Heat.	Mating.					

Period III. From 91 *to* 120 *Days* (3 *to* 4 *Months*).—The pregnant horn falls deeper into the abdominal cavity. The foetal fluids, cotyledons and the foetus may be palpated readily; the foetal length is about 30 to 35 cm. The right ovary is difficult to touch, a typical corpus luteum of pregnancy may be present, but in this period a cow may be pregnant and no corpus luteum palpable.

Period IV. From 121 *to* 150 *Days* (4 *to* 5 *Months*).—Up to the fourth to fifth month the foetus ordinarily lies upon the floor of the uterus and cannot without undue violence be palpated through its surrounding fluids. Especially at the fifth month, the uterus may have dropped so deeply downwards in the abdominal cavity that the foetus often is difficult to touch from the rectum. Towards the end of the fifth month the foetus is 40 to 45 cm. long. An important sign of pregnancy in this period is given by the uterine arteries. The middle uterine artery and the posterior uterine or vaginal artery as soon as pregnancy occurs take on greater activity and increase rapidly in volume. The middle uterine artery is recognisable from the fourth to fifth month, leaving the internal iliac artery at almost right angles to the arterial trunk from the region of the anterior border of the shaft of the ilium. It curves backwards, medially and finally in the form of an arc, forwards, to disappear in the uterine walls. The posterior uterine or vaginal artery, smaller than the other, emerges from the haemorrhoidal artery approximately opposite the os uteri externum and pursues a course analogous to that of the artery described above. Each of them is readily picked up and palpated.

With the fourth to fifth month of pregnancy these arteries become elongated, seem coiled, are greatly distended with blood and throb with a characteristic "whirr" unlike that of any other artery and wholly unlike the pulsation of the uterine artery in the absence of pregnancy.

Period V. From 151 *to* 180 *Days* (5 *to* 6 *Months*).—The pregnant horn, foetal fluids, cotyledons and foetus again are readily palpated. The foetus is about 45 to 50 cm. long. The middle uterine artery grows to 1½ to 2 cm. in diameter and the blood is forced through it under high pressure so that the characteristic pulsation is very distinct. In this period it is frequently possible by careful auscultation of the abdominal walls over the region of the foetus, to detect the beat of the foetal heart, which usually is at least twice as rapid as the beat of the maternal heart.

Period VI. From 181 *Days till the End of Pregnancy*.—The foetus can be palpated not only *per rectum* but also *per vaginam*. At this time, in many cases, some portions of the foetal body, usually the head and the two anterior feet, rest upon the vagina posterior or the os uteri externum. The uterine artery pulsation is distinct, the beat of the foetal heart is usually easy to hear. After the sixth month of pregnancy other portions of the foetus usually lie in close contact with the abdominal floor of the lower right flank region, and the well-known abdominal ballottement with the aid of the hand against the abdominal wall and also the movement of the foetus can be recognisable. In this period, pregnancy is so well advanced that almost all the signs of pregnancy occur and even the inexperienced examiner can easily recognise them (*see Diagram 3, overleaf*).

The Treatment of Sterility

Treatment of those cases in which heredity plays some part as a cause or in which the cure would be very prolonged, and too expensive, or when the cow is old or of little value, is not warranted on economic grounds.

Before application of the treatment the herd should be divided into groups of :—

1. Heifers and cows which show ovarian changes, cysts or corpora lutea persistentia; associated with anaphrodisia or nymphomania.
2. Cows which show chronic endometritis—pyometra, physometra, associated with anaphrodisia or nymphomania.
3. Heifers and cows which have proved impossible to get into calf and no pathological cause can be found.

In my practice, for the avoidance of mistakes and exact observation of the results of the treatment I used the following form of which the farmer received one copy.

Anaphrodisia (anoestrus) appears more frequently in heifers during the winter months. In such cases Graafian follicles usually begin to ripen a few weeks after the heifers have been turned out to grass in the spring. In many cases I had good results after adding to the food a handful of germ of oats twice a day, during two or three weeks.

The food for heifers with anaphrodisia must be rich in protein, and exercise should be tried with the bull. In heifers with nymphomania fodder poor in protein should be given, and in some cases even strict dietetical hunger twice in one week is indicated.

The condition in heifers in which corpora lutea persistentia or cysts cannot be detected in the ovaries and failure to come into heat* may be due to a low rate of secretion of gonadotrophic hormone or to wrong balance of the stimulating and luteinising fractions, will be discussed later.

If the cause of anaphrodisia is large ovarian cysts or corpus luteum persistens, these must be removed and this applies to heifers as well as cows. Large ovarian cysts can be ruptured by pressure through the rectal wall or through the vaginal wall.

One hand in the rectum is used to bring the ovary down to the top of the vagina from which, because of the thicker vaginal walls, more pressure can be safely applied by the other hand, or if necessary pressure from both can be exerted. In cases where the cyst is of long standing and the walls are very tough, or the cyst is small and situated centrally in the ovary, it can be punctured by a needle through the vaginal wall, by the same technique. In heifers the vagina is usually too narrow to admit the hand, so that the rupture must be by pressure with one hand from the rectum only.

In many cases cysts re-form in the ovaries after rupture. If, however, these newly formed cysts are ruptured again some seven to ten days after the first rupture, then a corpus luteum is formed from the granulosa cells and a normal cycle is produced. With heat normally about 21 days after the second rupture, if the cow is served conception will occur. Occasionally cases occur in which the ovary contains a cyst even though the cow ovulates and forms a corpus luteum. Such cows are very difficult to get in calf unless the cyst is ruptured (J. Hammond, 1939).

A number of years ago, instead of rupturing the cysts I injected into the cyst 1 or 2 c.c. filtrate from bull testes (see later) through the vaginal wall. After the injection the cyst-liquid transformed immediately into jelly, which I afterwards squeezed out *per rectum* by the same technique as corpus luteum persistens (see later) and the cysts did not re-form. My results are variable but in a proportion of cases by no means negligible recovery followed the treatment. The technique is easy. After bringing the ovary down to the top of the vagina with the right hand through the rectal wall, the thick and long syringe-needle, connected with a longer thin tube of rubber is pushed into the vagina with the left hand and driven into the ovarian cyst. Another person unites the tube hanging behind the vulva to the filled syringe and presses the piston. The same method could be used for injection of other hormones into the ovary.

The corpus luteum persistens is best removed from the ovary between the eighth and twelfth days after heat, when it is loosely attached and is most easily squeezed out. Before this time it is not fully developed and is too small to get out with certainty, while later it begins to sink down into the tissues of the ovary and is then much more difficult to remove (J. Hammond, 1939). Complete removal is necessary if the internal secretions of the ovary are to be affected.

* Also in heifers and in cows with the co-called "silent heat."

DIAGRAM 3

DIAGNOSIS OF EARLY PREGNANCY IN COW

Period I 30-60 days	*Period II* 61-90 days	*Period III* 91-120 days	*Period II'* 121-150 days	*Period V* 151-180 days	*Period VI* 181 days to the end of pregnancy
Vag. mucus adhesive, cervical canal closed and filled with mucus gelatin. Pregnant horn larger than the other and is smooth, firm, tense and fluctuating. At the region of the promontorium the superior uterine wall rises up suddenly like a terrace. The foetal fluids and cotyledons recognisable, sometimes also foetus. Corpus luteum distinct.	Uterus distinct and characteristically enlarged. The foetal fluids, cotyledons and foetus palpable. Corpus luteum of pregnancy distinct, large and firm.	The pregnant horn of uterus falls deeper into cav. abdominale. The foetal fluids, cotyledons and the foetus may be readily palpated. The right ovary is difficult to touch.	The foetus ordinarily lies upon the floor of the uterus and the foetus cannot without undue violence be palpated through its surrounding fluids. At the fifth month the uterus may have dropped so deeply downward in the abdominal cavity that the foetus is difficult to touch. The middle uterine arteries become elongated, seem coiled, are greatly distended with blood and throb with characteristic "whirr."	The pregnant horn, foetal fluids, cotyledons and foetus again readily are palpated. The middle uterine artery grows to 1½-2 cm. in diameter and the blood is forced through it under very high pressure, so that its characteristic pulsation is very distinct. The beat of the foetal heart by careful auscultation of the abdominal walls over the region of the foetus may be detected.	The foetus can be palpated not only *per rectum* but also *per vaginam*. The uterine artery pulsation is distinct. The beat of the foetal heart is usually easy to hear. After the sixth month of pregnancy the parts differ. Portions of the foetus usually lie in close contact with the abdominal floor of the lower right flank region, and the abdominal ballottement with the aid of the hand against the abdominal wall and also movement of the foetus can be recognisable.

The old well-known method described by Zschokke is used :—

In cows the squeezing may be performed by inserting the hand into the rectum, bringing the uterus into easy reach and steadying it, and through the wall of the rectum, grasp the ovary and by steady continuous pressure by the fingers at the base of the corpus luteum, loosen it from its attachment to the ovary. The removal of the corpus luteum may be done also by inserting one hand in the vagina, using this to pull back the cervix with the other hand in the rectum. For most cases it is easiest to grasp the corpus luteum within the fingers, so that when it is removed it remains within the fingers and the ovary slips back into its place.

I have often found cysts in corpora lutea persistentia (degenerated cystic corpora lutea) and in these cases if too hard pressure is put on in the centre of the corpus luteum it may split in two and only part be removed.

If the corpus luteum is removed fairly early in the cycle, the progesterone (lutenin) does not have much time to act and the second heat coming shortly afterwards keeps the reproductive organs under the influence of oestrus, and intensifies the physical symptoms of heat. After squeezing out the corpus luteum persistens heat occurs usually in from two to six days and the cow should then be mated (J. Hammond, 1939).

Cystic degeneration of the corpus luteum may occur as a sequel to uterine infection and is accompanied by irregular oestrus. Cysts should be ruptured, the remaining luteal tissue expressed and uterine treatment adopted.

Squeezing out the persistent corpus luteum is not always safe ; it should always be done carefully as afterwards fatalities sometimes result from internal haemorrhage from the ovaries. As a safeguard, the ovary should be lightly grasped for several minutes or so to arrest haemorrhage. Especially in all cases of suspected tuberculosis or hyalinic degeneration of the Fallopian tube (when it is distinct, thick, rough, hard and frail) any corpora lutea persistentia in the ovaries are expressed if possible. By mistaking corpus luteum persistens for corpus luteum of early pregnancy, the squeezing out of the corpus luteum may cause abortion of the embryo.

Prosecution of the veterinary surgeon by the farmer after the sudden death or abortion of the cow as a sequel to the squeezing of the corpus luteum is not rare, and for this reason the veterinary surgeon should inform the farmer beforehand of the possible danger of this operation and undertake it only on the clear demand of the owner.

Salpingitis (inflammation of the Fallopian tube) is usually associated with pyometra and is often bilateral, rarely unilateral. The Fallopian tube in the early stage of inflammation is not palpable *per rectum*, only its ligamentum-meso-salpinx is palpable.

Cervicitis is the most frequent specific lesion of the genital tract of sterile cows. It may be present alone or associated with vaginitis, metritis or salpingitis. Primary cervicitis is treated by irrigation of the cervix and uterus with watery iodine and by amputation of all protruding and inflamed cervical folds.

It is known that the majority of infertile cows suffer from endometritis, especially endometritis puerperalis. S. L. Hignett (1940) distinguishes four degrees of endometritis but the most common and important is pyometritis called shortly pyometra.

In simple chronic endometritis some slight counter-irritation of the genital tract is all that is necessary. Aqueous solution, 1 : 300 or 1 : 500, of iodine, injected into each horn, seems to be as good as anything for this purpose. Stronger iodine solutions may cause severe damage to the uterine mucosa, and suppress heat for some considerable time in many cases. It must be remembered that the iodine is being used as a stimulant or irritant and not as a bactericide, and in this respect, in some cases it will be sufficient only to paint the cervix with iodine (5 per cent.) or to induce on a swab with 10 per cent. iodoform or icthyol in oil or glycerine after dilating the cervix uteri.

In all cases of catarrhal endometritis or pyometritis the liquid or the pus must be removed and the best results are obtained from the generally known original treatment proposed by Hess and Albrechtsen. Each horn is irrigated in turn with 1 : 100 aqueous solution of iodine or 2 to 3 per cent. solution of bicarbonate of soda or normal physiological solution of NaCl, or also antiseptics, as, for instance : dettol, lysoform 1 to 2 per cent. (also other non-irritating, weak antiseptics are usual), until sufficient is injected. Only in grave cases is this repeated two or more times a week.

For quicker involution of the uterus after irrigation, a subcutaneous injection may be made of 5 to 10 c.c. of posterior pituitary extracts (glanduitrin, pituitrin, hypophysin, epiphysin, etc.).

When liquid or pus distends the uterus, the walls may be thin as in pregnancy, but they are soft and flaccid and the horns are probably equally filled. When the uterus is distended with pus, the contenst do not move as freely as the foetal liquids. In pyometra the uterine walls are thickening, or they are tense, and at some place an abscess of the uterus may appear. Frequently the uterus is very dense with thick hard walls. Pyometra prevents heat and often the corpus luteum persists, and usually sinks deeply into the centre of the ovary. In some cases, however, it may be well exposed, and the lack of heat, the enlarged uterus and distinct corpus luteum may occasionally give the inexperienced examiner the impression of early pregnancy.

The presence of maceration or a desiccation (foetus papyraceus, calcinaceus) *in utero* also ordinarily inhibits oestrus for a long time and here also mistakes will be easily made.

The pathological changes in the ovaries resulting from pyometra (corpora lutea persistentia, ovarian cysts) are secondary in character but in these cases it is necessary to express a functioning corpus luteum or cyst in order to obtain spontaneous contraction of the uterus.

Hormonal Treatment

The recent great advances made in the understanding of the sexual and reproductive processes and their relation to definite hormones, have naturally led to attempts to use these substances also in clinical veterinary medicine, especially in the therapy of animal sterility.

In disturbances of the sex cycle in cows I have injected intramuscularly (in some cases intraovarially) the filtrate from young bull testes.

With my assistant, Dr. B. Witkowski, v.s., the following experiments were made *in vitro* : when we mixed in a glass measure, for example, 1 c.c. liquid from normal Graafian follicle and added one or two drops of bull testes filtrate, the liquid did not change, but when we mixed the liquid from ovarian cysts and added one or two drops of bull testes filtrate, the mixture was transformed immediately into jelly. The ovaries and the testes were obtained from the slaughterhouse. The same result was obtained in mixing ovarian cysts-liquid from cows with bull testes filtrate, and also with filtrate from stallion, boar, ram, etc.

Progesterone (lutenin) is closely related chemically to testosterone and recent experiments have shown that it has some androgenic activity.

I have used the freshly made testes-filtrate from young bulls in the treatment of various uterine and ovarian disorders in cows with nymphomaniac symptoms, injecting 10 c.c., 15 or 20 cc.. filtrate intramuscularly once or twice in one week, and for big ovarian cysts have given 1 to 2 c.c. intraovarially.

The filtrate was prepared from one or two testes from perfectly healthy one- to two-year-old bulls from the slaughterhouse. The tunica propria was removed and the pulp passed through a mincer (No. 5), ten times as much normal physiological solution of NaCl was added and the mixture filtered. The freshly made filtrate is a light opaline liquid, contains very fine testes chyle, and after the addition of 0·5 per cent. carbolic acid, can be kept in a dark, cool place, fresh for one week.

The bull-testes filtrate was applied from 1932 till May, 1939, in over 800 cases in cows with symptoms of nymphomania or anaphrodisia and with corpus luteum persistens, small and large ovarian cysts and pyometra. In anaphrodisia the bull testes filtrate gave double results and in nymphomania with the corpus luteum persistens or ovarian cysts, after suppression of the corpus luteum or ovarian cysts, and intramuscular injections of 10 to 20 c.c. filtrate once or twice a week, the cows in 60 per cent. cases discontinued showing signs of nymphomania, ovulated normally and fecundated. Also in pyometra or physometra, the bull testes filtrate was demonstrated to have been of great assistance but only after three injections had been repeated daily.

The injection of anterior pituitary gonadotrophic hormone should never be given at the same time as the corpus luteum is removed, as in this case multiple ovulation may occur with the danger of twins or worse (P. Bhattacharya, J. Hammond, Jr., and F. Day, 1941).

Following injection the hormone is rapidly destroyed or secreted. It has been estimated that 60 to 80 per cent. of injected hormone disappears within ten hours so that it can have very little time to exert its effect on the ovary and often repeated injections of the hormone induce formation of anti-hormones, which inhibit the action of the hormone in the ovary (J. A. Nicholson, 1939). In addition, the cow is only a slightly sensitive animal for active hormonal preparations.

In my practice, I have used in addition to bull testes filtrate, several other commercial and standardised sex hormonal preparations. The best of these were : antuitrin " S " (Parke-Davis & Co.) and hormovilan (Bayer) in oil. The former (follicle stimulating hormone from pregnant women) is a well-known preparation. Hormovilan (oestrogens in oil in combination with vitamin, iodine and imbibing iron) has not a precisely known composition. Both these preparations induce oestrus in three to five days after injections in the cow with anaphrodisia.

Antuitrin "S" was injected chiefly intravenously in doses 2,000 to 3,000 rat units (1 c.c. = 500 r.u.). Hormovilan must be injected only intramuscularly, best in the muscles of hind leg in doses of 5 c.c. In nymphomania, hormovilan and antuitrin "S" had no effect.

In the majority of cases of cows and heifers with anaphrodisia, the ovaries will be very small and no large Graafian follicle or corpus luteum will be present in either ovary. In these the injection of the follicle-stimulating hormone from pregnant mare serum will induce oestrus two to three days after subcutaneous injection of 1,000 to 2,000 i.u. pregnant mare serum extract, but its use is not indicated in the treatment of any form of sterility except the anoestrous condition, when no corpus luteum can be detected in the ovary (P. Bhattacharya, J. Hammond, Jr., and F. Day, 1941).

Because the natural products are too expensive for veterinary practice, Folley and Malpress (1941) draw attention to the possibilities of treating anaphrodisia in cows and heifers by the synthetic oestrogen (oestradiol benzoate) which has all the properties of the naturally occurring hormone.

R. F. Montgomerie and G. Brownlee (1941) have treated anaphrodisia in cows and heifers with injections of stilboestrol dipropionate in doses of 10 to 20 mg., with very good results.

The hormonal treatment of nymphomania in cows has not been satisfactory, especially where no cysts or corpus luteum persistens are discernible. In these cases in my practice only injections of bull testes filtrate sometimes gave good results. The hormonal treatment of cow sterility holds out good prospects of success in some cases but so far this aspect of the subject has received only slight attention.

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Weekly Wisdom

"The allied people have learnt to recognise in these years the terrible positive power of evil; the Nazis fight as a dedicated people, and their sinister faith has been itself a weapon. It can only be opposed by another faith, not inferior in intensity and far loftier in content. . . . The overthrow of evil force implies and requires the foundation of a world order built up on a design worthy of the sacrifices that have been made for it."—The Times, September 3rd, 1942.

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Concern is being caused throughout South Africa by reports of wholesale shooting of game on the borders of the Kruger National Park. It is stated that farmers have purchased virgin bush farms and converted them into shooting boxes, and that they return after orgies of destruction with trucks of venison, beef and biltong which they sell profitably to butchers. Although they are acting within the game laws, they are threatening the existence of the Park, which has become a sanctuary of world repute.—*African World.*

CLINICAL COMMUNICATION

Strangulated Umbilical Hernia

Operation and Death

R. HUDSON, F.R.C.V.S.,

Retford, Notts.

Subject.—A Shire mare, eight years old, in good working condition.

History.—I attended her about four months previously for an attack of colic and then found the bowel strangulated in the umbilical sac. I was able to reduce it by manipulation and the pain passed off. An operation was then advised but the owner was not prepared to have it done. This time I could not reduce it so an operation had to be risked.

Symptoms.—The mare had been in pain about eight hours—probably more, for she had been at grass during the night and showed pain when brought in at 7 a.m. The hernia was the size of a large orange. The mare showed considerable pain and was sweating; her pulse was good—about 60—and her membranes were a good colour. I did not think any fatal symptoms had developed and so thought an operation worth attempting.

Operation.—The patient was put down by an intravenous injection of chloral hydrate—2½ ounces in 24 ounces of water—and she took 22 ounces before falling. The solution was pumped into the vein by air pressure on the solution. Anaesthesia was perfect except for slight pain when the superfluous skin of the sac was excised.

The patient was supported on each side by a stuffed sacks and the hind legs extended backwards and tied to posts. The fore-legs were tied up in the usual way. This is a much better position because the abdominal hole is stretched longitudinally and easier to close and the legs are out of the way of the operator, whereas in the usual method, with the hind feet to the elbows, the abdominal hole always has a tendency to stretch laterally.

An incision was carefully made at the posterior of the sac, at the junction with the abdomen, and carried over to the front. It was intended that the abdomen should be opened about 1 inch from the hole and then the sac opened gradually, for fear of adhesions and penetration of the bowel. On penetrating, a small quantity of yellow serous rather dirty fluid escaped. Extending the opening through the edge of the ring I tried to replace the bowel, but could not, so a blunt bistoury was inserted, the sac incised and the bowel exposed. It was free from adhesions and though congested looked healthy. It still resisted pressure and accordingly the opening was further enlarged (in all about 1½ inches) when it was easily replaced. There was no further escape of fluid.

The peritoneal sac was very inflamed and thickened, and most of it was removed.

The wound was sutured with wire which in previous cases had answered well and given no trouble. The skin wound was closed by wire and flax sutures, the wire passing through the skin and deeply into the abdominal wall, so bringing skin and fascia into close apposition and giving greater support.

Tincture of iodine was applied to the wound and the ropes were then removed.

Course.—By the time I had had tea and packed up the mare was up. She was given a 5 drachm aloes ball and tied up to prevent her lying down.

I saw her about 10 a.m. the next morning and found she had been in pain since about 7 a.m. The case was hopeless, so I gave the mare an injection of chloral hydrate and she slept until 2 p.m., when she died.

Post-mortem Examination.—This showed peritonitis with a large quantity of fluid. The part which had been fixed in the hernia was found to be ileum, about 1½ feet from the ileocaecal valve. A patch (about 8 inches) was swollen and inflamed, and in the centre was a roughly punched out hole, approximately 3 inches by 1½ inches. Evidently it had been unable to stand the pressure of food behind the obstruction.

The wound was satisfactory and had stood the strain of the mare rolling about in pain for some hours without a suture being disturbed.

Dr. Robert Wilson Gibson, who has died at the age of 80 years at Orton, Westmorland, was the convener of the first committee which in 1905 administered the grants of the Polo and Riding Pony Society for Fell pony stallions. As an outcome of the work of that committee, the Fell Pony Society was formed, and he was the first Chairman, with the late Mr. F. W. Garnett, F.R.C.V.S., as Hon. Secretary.

THE VETERINARY RECORD

October 10th, 1942

VETERINARY EDUCATIONAL TRUST

IT often happens that those who live closest to great events are least conscious of their ultimate significance. Timely appreciation may enable opportunities to be seized which in the absence of guidance, suggestion or a word in season, may be lost or wasted. It may well be that in affairs veterinary a tide is approaching which, taken at the flood, may lead on to increased usefulness and service.

The full significance of the formation for the first time in our history of a trust for veterinary education will probably not be immediately appreciated by all of us. It seems clear that the potentialities of the Veterinary Educational Trust, the formation of which was announced by the President of the Association on Friday, September 25th, at the Mansion House Luncheon, should be brought home to every member of the veterinary profession as early and as quickly as possible, if it is to receive that measure of confidence and support which it so much deserves. Its potentialities can be visualised by a thoughtful scrutiny of the relevant literature, published in our previous issue.

The veterinary profession is unique among professions. Throughout its history during the last hundred years or more, it has been on the whole as remarkable for its vigour as for its small size. Many or most of its outstanding achievements in the past have been brought about by the vision and concentrated effort of its individual members rather than by aid from outside. These men, often in the face of adverse criticism at the outset, have gradually persuaded first a few, later a majority and finally all, of the worth and value of each new concept.

The sister science, Medicine, and what we might call the elder brother, Agriculture, and most other branches of learning have each benefited by many spontaneous endowments, handsome donations, scholarships and gifts, from those outside their ranks. The veterinary profession has had a meagre, though none the less appreciated, share of such benefits. It is not an over-statement to say that with a few notable exceptions practically all the present facilities for teaching and research have arisen directly from the effort, initiative and industry, individual and collective, of members of the veterinary profession themselves. In the early days medical men participated in these efforts but only after they had become fully identified with the veterinary profession. These efforts have been instrumental in founding, building, equipping and even re-building the teaching colleges, in founding, establishing and developing the two great corporate bodies, and in maintaining the profession vigorous, healthy and up to date.

The record is one which, considering all the many handicaps, few, if any, other learned professions can surpass, and we may well be proud of it.

Veterinary education has been criticised and attacked by those within and without the profession. Deficiencies and inadequacies there undoubtedly are, and probably will continue to be, but the achievements of the past and the prospects for the future are by no means discouraging. Progress has taken place year by year, often slowly but always steadily, and invariably most notably when the profession was determined to help itself.

Just as they have done in the past years, members of the profession must still continue to strive energetically and enthusiastically for the benefit of veterinary science and for the future welfare of the community. Is it too much to ask that each of us should make the success of the Veterinary Educational Trust his own personal concern? If the profession can do this its success is assured, for it is certain that members of the general public will be induced to support the Trust very largely in direct ratio as we each show ourselves keen and active in the furtherance of its aims. Opportunities will occur to each of us to contribute or to collect funds, small or large, to bring the existence of the Trust to the notice of our more wealthy clients, to do whatever we can to persuade committees, corporations and other bodies to support it. We shall not be doing all in our power for the future welfare of our profession if we let these chances pass. The goal of one million pounds may seem ambitious, but there can be no doubt that it can be achieved if we all do our best. By so doing we shall demonstrate that we can fulfil our duty and discharge our obligations equally with those the fruits of whose efforts we now enjoy. Further, we shall leave the profession a little better than we found it, just as did those who so ably laid the foundations for the social and economic position which the veterinary profession now occupies.

ABSTRACTS

[BOVINE THERAPEUTICS. GIBBONS, W. J. (1940.) *Cornell Vet.* **30**. 47-51.]

Bi-daily subcutaneous injections of 200 to 300 c.c. of the dam's blood is advocated in weakling calves. Autogenous colon bacterin is used with some success in pregnant dams where virulent colon septicaemia is prevalent in calves. In addition to current methods of isolation and segregation, mortality from calf pneumonia has dropped 25 per cent. by the use of 150 gr. sulphonamide twice daily. The more recent use of sulphapyridine gave even better results. Acute indigestion is treated by the use of the stomach tube to evacuate gas and introduce up to one gallon of mineral oil and antiferments in large quantities of warm water. Severe cases with intoxication also receive 500 c.c. calcium gluconate with 1 gramme of methylene blue. 10 c.c. anterior pituitary is used for acetonaemia, especially where there is a tendency to relapse. The author ends with an outline of indications for intravenous medication.

G. V. L.

* * * * *

[THE TREATMENT OF ACTINOBACILLOSIS BY INTRAVENOUS INJECTION OF SODIUM IODIDE. ROPERT, J. (1942.) *Austral. vet. J.* **18**. 35-37.]

Two cases are reported where well-established lesions of actinobacillosis responded to treatment by this method. No untoward effects resulted from the intravenous injections. Complete cures in both cases were obtained in six to nine weeks; three doses were given at 18-day intervals.

Each injection consisted of 30 grammes commercial sodium iodide dissolved in 550 c.c. boiled distilled water. The apparatus comprised a large container with a rubber stopper through which passed two glass tubes—an air intake and an outlet for the injection. The outlet was connected by rubber tubing to a large bore hypodermic needle and the injection made into the jugular vein in the usual manner. The bottle was inverted at a height of 6 to 7 feet and the dose allowed to gravitate into the vein, care being taken to evacuate all air from the outlet tube before commencing.

The first injection arrested growth of the lesion and resolution began after the second injection.

C. D.

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[SYNDROME OF DESTRUCTION OF PINEAL GLAND. MARTIN, J., and DAVIS, L. (1941.) *Arch. intern. Med.* **67**. 1119-1128.]

Over 100 kittens were successfully "pinealectomised"—the pineal tissue was actually coagulated—by galvanic stimulation; recoveries from the operation were good. Pinealectomised females appeared to grow as well as normal controls, but came into oestrus later, and after mating gave birth to small litters of either stillborn or feeble kittens. Maternal behaviour was under-developed, and in very few cases only was there a normal supply of milk.

Pinealectomised males appeared to be more precocious than normal controls, and developed into larger animals with more prominent external genitalia. The offspring of pinealectomised males and normal females were few in number and usually feeble. Second generation kittens were reared with very great difficulty.

A limited number of experiments with puppies indicated similar effects from pineal destruction. Some human cases, in which pineal tumours were present, are described, and the symptoms do not appear to be incompatible with the laboratory findings.

A. N. W.

QUESTIONS IN PARLIAMENT

Production (Scientific Advisers)

The Minister of Production (Mr. Lyttelton): A number of Questions have been tabled during the Recess on the subject of the three Scientific Advisers recently appointed to my staff. I hope it will be for the convenience of the House if I make a brief statement on the powers and duties which, in agreement with my colleagues, they have been given.

First, I should like to make it clear that I have not created a new Scientific Board. There appears to be some misconception about this. The three Scientific Advisers have been appointed as whole-time members of my staff and will work under the supervision of the Lord Privy Seal acting on my behalf. Their field of activity will be co-extensive with that over which I exercise my powers; they will work together or individually according to the nature of problems under investigation. Their advice and recommendations will normally be presented to me through the Lord Privy Seal; it will, of course, be for me to bring their advice and recommendations to the notice of the War Cabinet as may be necessary.

These appointments have been made with a view to completing the existing organisation for scientific research and development in the field of production, and will provide the further measure of co-ordination which the creation of a Ministry of Production has now rendered possible under my direction. The Scientific Advisers will advise me on existing organisations for scientific research activities in any case in which it appears to them that the existing arrangements are deficient or inadequate. They may act for me with the technical side of any service or other department engaged in scientific work which appears on the general field for which I am responsible. I shall call upon them, from time to time, to make reports upon particular matters, but in addition, they may initiate enquiries into any matters within their field. They will, of course, be provided with adequate technical and other staff.

The Scientific Advisers may obtain through the head of the department or establishment concerned or, in the case of certain highly secret information as may be approved between myself and the Minister concerned, any information relevant to the execution of their duties. The Scientific Advisers will, of course, not interfere with the work which is being done by the very large and numerous scientific and technical staffs of departments or with that of any existing inter-departmental organisation. They fully appreciate the importance of this. With these arrangements I feel that they will have full scope for their work which will be of great importance, and enable them to make a noteworthy contribution to the development of scientific and technical research in the field of production.

Later, at the same sitting, Mr. R. Morgan asked the Minister of Production whether, in connection with the recent appointment of three full-time scientific advisers to work under his supervision, it is proposed to develop their work with the object of linking science and technology more closely with the whole strategy and direction of the war?

Mr. David Adams asked the Minister of Production whether it is intended that the three scientific advisers recently appointed to work under his general supervision are to have direct access to the War Cabinet on a non-departmental basis; and whether, in view of the desirability of such a course, he will take steps to make it clear that these advisers can exercise this right?

Mr. Mander asked the Minister of Production whether the three full time scientific advisers to the staff of the Ministry of Production will have direct access to the War Cabinet and if the Lord Privy Seal will exercise his supervisory functions over the new body directly on behalf of the War Cabinet?

Sir R. Clarry asked the Lord Privy Seal what authority will be given to the scientific advisers appointed to work under his supervision in order to enable them to conduct inquiries, elicit information, and examine Departmental papers for the purpose of carrying out effectively the co-ordinating functions they are to perform?

Mr. Lyttelton: I would refer the hon. Members to the statement on the subject of the scientific advisers recently appointed to my staff which I made at the end of Question Time to-day.

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Scientific Advisory Committee

Mr. I. Thomas asked the Lord President of the Council who are the members of the Scientific Advisory Committee of the War Cabinet; what are the duties of this committee; and what are its relations with the newly appointed scientific advisers of the Ministry of Production?

The Lord President of the Council (Sir John Anderson): The scientific members of the committee are:—

Sir Henry Dale—President of the Royal Society.

The two Joint Secretaries of the Royal Society, one of whom is my hon. Friend the Junior Burgess of Cambridge University (Prof. A. V. Hill) and the other Professor A. C. G. Egerton.

Sir Edward Appleton—Secretary of the Department of Scientific and Industrial Research.

Sir Edward Mellanby—Secretary of the Medical Research Council.

Dr. W. W. C. Topley—Secretary of the Agricultural Research Council.

The functions of the committee are:—

(*a*) To advise the Government on any scientific problems referred to it;

(*b*) To advise Government Departments, when required, on the selection of individuals for particular lines of scientific inquiry or for membership of committees on which scientists are required;

(*c*) To bring to the notice of the Government promising new scientific or technical developments which may be of importance to the war effort.

It was never intended that the committee should usurp the functions of the scientific and technical advisers of Departments, and the appointment of these three Scientific Advisers to the staff of a new Ministry of Production in no way affects the scope or the responsibilities of the committee. The committee will naturally consult with the Scientific Advisers to the Minister of Production upon matters which fall within their province.

Mr. Thomas: Are questions being in fact referred to this body, and is it being fully used?

Sir J. Anderson: I have sometimes wished that Departments would make more use of the services of this committee. It has, in fact, been of great assistance to the Government as a whole and to Departments.

Mr. Levy: What procedure is to be adopted in order that these eminent gentlemen can collect the information about which they are to make decisions?

Sir J. Anderson: That question relates to the functions of the Minister of Production, which is a separate matter.

Sir H. Williams: What is the difference between the functions of this new scientific body and the one announced the day before yesterday, as they seem to be completely overlapping?

Sir J. Anderson: This is not a new body——

Sir H. Williams: The one announced the day before yesterday is new.

Sir J. Anderson: I am not sure whether my hon. Friend is not referring to the advisers of the Ministry of Production. They are individuals appointed to advise a Department. Every Department whose work involves the use of scientific knowledge has always had its own staff of scientific advisers and has access as necessary to outside advice.

Sir H. Williams: As the Ministry of Production co-ordinates about six other Departments, each of which has its own scientific advisers, where are we?

Mr. De le Bere: We are nowhere at all.

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Milk

Mr. David Adams asked the Minister of Health whether it is intended in schemes of post-war reconstruction that one grade of milk only will be supplied for the whole population, to be guaranteed clean, fresh, palatable and free from pathogenic organisms?

Mr. E. Brown: The Government fully appreciate the importance of taking all possible steps to secure the quality and safety of the milk supply, but it is not yet possible to lay down how this end can best be secured.

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Milk Tests, Newcastle-on-Tyne

Mr. David Adams asked the Parliamentary Secretary to the Ministry of Food whether he is aware that tests taken by Newcastle Corporation of milk supplied for consumption in Newcastle-upon-Tyne, for the year September, 1940, to August, 1941, and September, 1941, to August, 1942, respectively, show percentages; tuberculin tested certified 26·6 and 35·5, tuberculin tested 12·0 and 26·5, accredited 22·7 and 24·7, pasteurised 6·5 and 25·5 and undesignated 35·0 and 35·3; and whether it is intended forthwith to establish throughout the country scientific pasteurisation, handling and delivery of milk?

Mr. Mabane: No, Sir, I am not aware of the tests to which my hon. Friend refers. My hon. Friend will appreciate that in any case it is not possible, in the absence of information as to the nature of the tests, to estimate the significance of the figures given. In reply to a Question by my hon. Friend on September 10th, information was given of the steps being taken by the various Government Departments concerned for improving the quality of milk.

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Foot-and-Mouth Disease

Sir Percy Hurd asked the Minister of Agriculture the extent of the recent outbreak of foot-and-mouth disease in the West Country; its source; and what steps are being taken to prevent its recurrence?

Mr. Hudson: There have been rather more than 250 outbreaks of foot-and-mouth disease in the Bath infected area, the natural spread of the disease from the initial outbreak on July 11th being

NOTES AND NEWS

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

Oct. 13th.—R.C.V.S. Council and Committee Meetings, Royal Station Hotel, York.
Oct. 14th.—R.C.V.S. Council and Committee Meetings, Royal Station Hotel, York.
Oct. 16th.—Meeting of the Mid-West Division, N.V.M.A., at Bath, 3 p.m.
Oct. 24th.—First Annual General Meeting of the Society of Women Veterinary Surgeons, Friends' House, Euston Road, N.W.1, 2.30 p.m.
Oct. 30th.—Meeting of the Yorkshire Division, N.V.M.A., at Leeds, 2.30 p.m.

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Roll of Honour

FLYING OFFICER GEOFFREY F. BRITTLEBANK

We have to record with deep regret the death, announced on October 3rd, of Flying Officer Geoffrey Franklin Brittlebank, younger son of Lieut.-Col. J. W. Brittlebank, C.M.G., M.R.C.V.S., and Mrs. Brittlebank, of Wimborne House, Sawbridgeworth, Herts.

The deep sympathy of all members of the profession will be extended to Colonel and Mrs. Brittlebank in their grievous loss. Geoffrey, who was 21 years old, and a Flying Instructor, R.A.F., entered the Royal Veterinary College in 1939, but gave up the course in order to enter the Air Force. That his patriotic action has entailed the great sacrifice will be both a profound sorrow and an honoured memory to all his fellows.

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PERSONAL

Births.—DUNN.—At Redlands, Glasgow, on September 10th, 1942, to Evelyn Frances (*née* McLaughlin), wife of John Drummond Dunn, M.R.C.V.S., Rutherglen, a daughter.

FRANCIS.—On September 30th, 1942, to Sally Anne, the wife of John Francis, M.R.C.V.S., at the Maternity Home, Heathside Road, Woking—a son, Richard James.

OVINGTON.—On October 2nd, 1942, to Greta, wife of R. P. Ovington, M.R.C.V.S., of Croft House, Newent, Glos.—a daughter.

WALPOLE.—On August 8th, 1942, to Gwyneth, wife of Robert O. W. Walpole, M.R.C.V.S., Wolverhampton, Staffordshire, a daughter.

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Mr. H. L. Roberts, F.R.C.V.S., of Ipswich, has been appointed official Veterinary Surgeon to the Red Poll Cattle Society.

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SERVICE ANNOUNCEMENTS

The London Gazette of September 22nd, 1942, contains the following announcements:—

ROYAL ARMY VETERINARY CORPS

The undermentioned to be Lts.: James Lang, B.Sc. (244425) (Sept. 2nd, 1942); John Lionel Foster (244422) (Sept. 3rd, 1942).

INTELLIGENCE CORPS

Capt. H. B. Williams, O.B.E. (11336), from R.A.V.C., to be Capt. July 24th, 1942, retaining his present seniority.

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THE VETERINARY EDUCATIONAL TRUST

UNANIMOUS PRESS WELCOME

The announcement by Dr. Wooldridge at the Mansion House Luncheon of the establishment of a Veterinary Educational Trust has been warmly welcomed by both the national and the agricultural Press. In our issue of last week we reproduced the encouraging comment made by *The Times*. *The Daily Telegraph*, in its issue of September 30th, said: "Probably the greatest single contribution to the expansion of home-produced food supplies would be the elimination of animal diseases, especially in dairy cattle. Last week Dr. Wooldridge, the President of the National Veterinary Medical Association, estimated that 60 per cent. of our dairy cattle were infected with one disease or another, and assessed at £50,000,000 annually the saving that could be achieved by what he called 'a bold co-ordinated animal health service.' The annual loss in milk output from three principal cattle diseases is still probably not much different from the 200,000,000 gallons at which it was put by an expert committee two years ago. This is equivalent to the whole output in England and Wales of the two peak summer months. It is impossible to hope that even a partial eradication of disease on such an immense scale can be accomplished quickly, but the Minister has shown a keen interest in the problem. If he and the veterinary profession between them could devise and apply a really practical remedy they would place the country greatly in their debt."

Typical of the reaction of the farming journals is the following editorial reference in last week's issue of *The Farmers' Weekly*:—

"There is the suggestion of a quietened conscience about the genuine welcome given to the new Veterinary Educational Trust. Well there might be. To say, as the Government Committee did in 1938, that veterinary education has been starved and practical training neglected, is a prime example of understatement—and the reproach has outlived it. The fact is we have been taking inexcusable risks with the best livestock in the world—not to mention the health of the people. Many of the statements made at the annual meeting of the N.V.M.A. were frightening. . . . My own view is that the £1,000,000 is an instalment—good enough to go on with. It's the way to look at it. We have to double the number of active veterinary surgeons and put an entirely fresh complexion on veterinary education. If that can be done for the money, good enough.

That is one part of the story. The next question is how are the veterinary surgeons to be empowered to see things in their own enlightened way subject, of course, to suitable checks. Dr. Wooldridge's idea of an Animal Health Association with State-appointed Governors and a veterinarian on top is something to think about while the money is being collected for the other business. The N.V.M.A. deserves well of the farming industry, but as a voluntary body it lacks teeth and for the work to be done it would need them."

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DOGS FOR WAR SERVICE

Suitable dogs for War Service are urgently required on loan for the duration of the war for employment by the Army and other Ministries.

It is, therefore, desirable that no dog of potential use to the State should be destroyed on account of food shortage or other difficulties of maintenance associated with war-time conditons.

The responsibility for the provision of dogs is vested in the Director of Army Veterinary and Remount Services, who would be grateful for the co-operaton of members of the profession in dissuading the public from having young, intelligent and healthy dogs of suitable breeds destroyed, whilst opportunities exist for their useful employment on War Service.

Suitable dogs of the following breeds are required particularly: Alsatians, working Collies and Airedales. Crosses of these breeds and also Bull-terriers, Lurchers, Elk-hounds, Himalayan Sheep-dogs, Boxers and Rhodesian Ridge-Backs are also usually worth a trial. Few gun-dogs, hounds or terriers and, of course, none of the toy breeds are useful.

Within the breeds specified as potentially suitable, intelligence and obedience are the essential qualifications. Youth (9 months to 2 years) is a considerable advantage, but greater age is not always a bar to acceptance.

Registration of dogs can be carried out by any Inspector of the R.S.P.C.A. or Canine Defence League, who will also furnish full particulars of the War Dogs Training Scheme. The address of the nearest Inspector can be obtained from the local police station.

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PULLET REPLACEMENT AND DOMESTIC POULTRY RATIONING SCHEMES

Mr. Tom Williams, Joint Parliamentary Secretary to the Ministry of Agriculture and Fisheries, and Chairman of the Domestic Poultry-Keepers' Council, recently received a deputation representative of poultry breeders and hatcheries. The deputation

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aggravated by movements of the public over the countryside during the holiday season. Disease first appeared in pigs fed on swill. It is understood that the swill was boiled before being fed to the pigs. It can, therefore, be inferred that infection was conveyed to the pigs from the swill before it was boiled. It is, I am afraid, impossible to obviate entirely the risks associated with the use of swill, but steps are being taken to ensure, as far as is practicable, that swill is treated before distribution to farms.

submitted a case for additional rations of feeding-stuffs for breeders to enable them to rear for a further two or three months pullets which had become difficult to sell as laying stock, since the announcement of the new Domestic Poultry Rationing Scheme. It was considered by the deputation that if these pullets could be carried on to the point of lay, a ready market would be found for them.

The Parliamentary Secretary expressed sympathy with breeders in their difficulties, but regretted that in the light of the feeding-stuffs position he could hold out no hope that the deputation's request could be met. He pointed out that since the pullet replacement scheme had been launched in December last supplies of feeding-stuffs had seriously diminished, and present commitments would absorb the whole of the supplies now in sight.

The deputation also asked whether they could be given some guidance as to the extent to which it would be advisable to breed next season. Mr. Williams thought it impossible to attempt any forecast at this stage; but without giving any promise of additional feeding-stuffs, he said he would give some intimation next December as to the possibilities, so far as they could then be foreseen.

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SCHEME FOR THE CONTROL OF DISEASES OF DAIRY CATTLE

STATEMENT SHOWING THE NUMBER OF UNDERTAKINGS NOTIFIED TO THE MINISTRY OF AGRICULTURE DURING THE WEEK ENDED OCTOBER 3RD, 1942

County	Undertakings Notified		Total Undertakings		
	During Week	Previously	Number	Number of Cattle	
				Cows	Heifers
ENGLAND					
Bedford	—	24	24	637	426
Berks	2	38	40	1,401	965
Bucks	3	28	31	866	623
Cambridge	—	9	9	185	92
Chester	3	216	219	7,779	2,564
Cornwall	—	—	—	—	—
Cumberland	—	20	20	623	574
Derby	7	102	109	3,352	1,968
Devon	4	73	77	1,361	867
Dorset	—	28	28	915	611
Durham	7	130	137	3,154	844
Essex	1	117	118	4,992	2,867
Gloucester	8	44	52	1,753	927
Hampshire	3	160	163	5,119	3,250
Hereford	—	13	13	228	111
Hertford	2	38	40	1,281	833
Hunts	—	5	5	148	92
Isle of Ely	—	1	1	1	8
Isle of Wight	—	4	4	55	15
Kent	2	61	63	1,281	772
Lancs.	4	100	104	3,018	825
Leics	—	35	35	982	647
Lincs (Holland)	—	4	4	45	11
Lincs (Kesteven)	1	11	12	135	80
Lincs (Lindsay)	2	32	34	620	254
Middlesex	—	5	5	259	122
Norfolk	2	112	114	3,384	2,245
Northants	2	39	41	1,134	900
Northumberland	—	38	38	1,225	608
Notts	4	50	54	1,302	674
Oxford	1	18	19	493	60
Rutland	—	6	6	110	68
Salop	11	140	151	4,829	2,273
Soke of Peterborough	—	—	—	—	—
Somerset	7	68	75	2,084	817
Staffs	5	97	102	3,084	1,574
Suffolk, East	4	45	49	1,288	957
Suffolk, West	1	24	25	473	334
Surrey	5	58	63	1,831	858
Sussex, East	—	89	89	2,405	1,261
Sussex, West	2	59	61	1,802	1,113
Warwick	1	72	73	1,939	1,269
Westmorland	1	14	15	352	383
Wilts	—	40	40	1,770	1,015
Worcester	6	102	108	2,345	1,174
Yorks, E.R.	1	32	33	650	304
Yorks, N.R.	2	59	61	1,280	683
Yorks, W.R.	6	137	143	3,711	1,397
WALES					
Anglesey	1	11	12	208	73
Brecon	—	2	2	25	9
Caernarvon	1	80	81	1,427	699
Cardigan	—	12	12	170	119
Carmarthen	1	136	137	2,572	1,346
Denbigh	—	37	37	771	372
Flint	—	66	66	1,459	697
Glamorgan	1	47	48	763	284
Merioneth	1	7	8	100	72
Monmouth	—	17	17	459	265
Montgomery	1	6	7	163	133
Pembroke	1	60	61	1,179	735
Radnor	—	—	—	—	—
TOTALS	117	3,078	3,195	86,968	45,569

Note.—Of the total 3,195 undertakings notified to date 842 are for 1 year, 186 are for 2 years, and 2,167 are for 3 years.

ROYAL SOCIETY OF MEDICINE

SECTION OF COMPARATIVE MEDICINE

The four meetings of the next session of the Comparative Section, Royal Society of Medicine, will each be devoted to Immunity and the programme will be as follows:—

(1) The General Principles of Immunity; (2) Bacterial Vaccines and Toxoids; (3) Immunity to Tuberculosis and (4) Immunity to Viruses. Details of this interesting programme will be found in our notices column.

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Erratum.—In the resolution quoted by Mr. Motton in the second paragraph of his letter published on p. 406 of our last issue, the words "and to Divisions" *should read* "and to the Division."

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MINISTRY OF AGRICULTURE NEWS SERVICE

AUTUMN CALVERS MORE PROFITABLE

100 *Gallons More Milk per Cow, says Farmer.*—A progressive dairy farmer in Aberdeenshire, worried over a rapid fall in milk production, consulted his records of calving and service dates. From these he prepared a list showing each cow's performance. The 1941 autumn calvers, particularly the heifers, had done well; most of them were still milking. Those due to calve in September and October were marked to be put dry as soon as possible. January-March calvers were quite good. But April-July calvers were most disappointing, the majority never reaching a good yield. Those that did so in July fell off rapidly in August.

The farmer's conclusion, in his own words, was: "I don't like late spring and summer calvers, of course, but it is not easy to make up one's mind to keep a beast away from the bull until the New Year, if she has not settled by the May term. At first sight it looks uneconomical to have 20 months between calvings, even for a few cows, but I have thought out this problem, and I am convinced it is better so than to have late spring calvers going dry in winter, and taking up valuable accommodation. Back-end calvers are always more profitable than spring calvers. They give at least 100 gallons more, and look at their value per head in the herd."

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STORY WITH A MORAL

The Efficient Producer and a Sour Milk Problem.—This is the story of an efficient producer who had his milk consignments returned for a considerable period because of sourage. It is also the story of a wise producer who, sensing trouble that was not obvious in his scrupulous method, invited official co-operation in his search for the cause. Let the official report speak for itself:—

"Fortunately, Mr. —— did not mistrust the buyer's methods of testing, but willingly agreed that the County Dairy Instructress should visit the farm. On finding that the production methods were of a high standard, Miss —— had difficulty in advising Mr. —— where to rectify the trouble. All his cows were tested and were apparently free from mastitis, the cowsheds and other buildings were very clean, the milking methods and handling generally were very good and the milking machine and utensils were well sterilised after use. Yet the milk continued to fail the factory test and was rejected. Samples sent to —— also showed bad results.

"Then Mr. ——, a dairy bacteriologist, interested himself in the case and bacteriological examinations were made at various stages in the routine. Finally, it was found that swabs, or rinsings, taken from the milking machine teat-cup liners after they had been boiled in Miss ——'s presence, showed heavy bacterial contamination. Apparently a colony of some spore-forming thermophylic bacteria had infected the apparatus and consequently resisted boiling and attempts at sterilising. Mr. —— scrapped these teat-cup liners and obtained a new set, since when the trouble has ceased."

The moral here is—co-operation!

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BREEDING TO FOOD SUPPLIES

The One-Farrow System.—Under war conditions the number of breeding sows that can be kept in most herds is limited by the available food supply. As a war-time method of management, pig breeders might give serious attention to the "One-Farrow System." Results obtained by the Pig Husbandry Research Station at Wye College, Kent, show that by this method nine gilts and their litters can be fed on the quantity of food that would be required by five sows and their litters kept in the normal two-farrow way. The sows are stocked to farrow in the summer and are fattened after their litters have been weaned. Sufficient young gilts

are raised to provide the farrows required in the following summer. The remainder of the pigs are fattened. Winter farrowing is thus avoided.

Gilts will rear their first litter quite well if they and the pigs they are suckling are allowed out to graze. Under the one farrow system this is usually possible, as all litters are born in the summer. At Wye the gilts and their litters were allowed two hours' grazing a day between the time they were 2 and 8 weeks old.

There is very little difference in the output of meat under this system. In the Wye experiment five sows kept on the two-farrow system produced 85 bacon carcases, whereas the corresponding unit on the one-farrow system composed of nine gilts gave 80 bacon carcases. This is less than the variations that occur in the average size of litters from year to year.

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Anaemia in Young Pigs

Earth Sods a Good Preventive.—Piglets, particularly those sty-reared, are liable to anaemia, which is often associated with scour. In Canada this trouble has been prevented by means that have also proved successful in this country. During the first six weeks of the young pigs' life, swabbing the udder of the nursing sow once daily with a solution of a soluble iron salt or administering a dose of a similar solution to each pig once weekly are well-known preventive measures. Another method, however, that has proved very successful is the provision of earth sods for the brood sow and the subsequent litter. For the past three years, at the Dominion Experimental Station, Kapuskasing, Ontario, earth sods taken from a field free from pig worms have been stored in the autumn and made available to the brood sow and young pigs during winter. The sods are one foot square, and one is given every third day to the sow previous to farrowing and every day after. The young pigs at two to three days old start to root and nibble these sods. Where soils are deficient in iron it is necessary to sprinkle them with dry sulphate of iron before they are stored, or to wet them with a solution of iron sulphate before giving to the pigs: the strength of the solution is 6 oz. ferrous sulphate to 1 gallon of water.

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Concentrated Swill for Fattening Pigs.—Trials with concentrated swill produced by the Brighton Corporation have recently been concluded at the Pig Husbandry Research Station at Wye, Kent. The results show conclusively that the material, when fed with a small meal supplement, provides all that any pig feeder requires to produce good quality bacon.

The method of feeding was as follows: After weaning, the pigs were fed on meal until they were eating 2½ lb. per head per day, the maximum allowance fed. Later they received the same daily amount of meal plus as much concentrated swill as they could clear up readily. At 60 lb. live weight, they ate about 3 lb. of concentrated swill per head per day, at 120 lb. live weight about 10¼ lb., and at 180 lb. and over 12¼ lb. The pigs gained 1 lb. per head each day during the experimental period. Results obtained in a subsidiary trial indicated that very satisfactory results could still be obtained if the meal ration was restricted to a daily allowance of 2 lb. per head. When the live weight exceeded 120 lb. some of the pigs were fed entirely on the concentrated swill and continued to make satisfactory progress.

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Surplus Straw

Farmyard Manure in Temporary Yards.—Every effort should be made to return to the land as much as possible of the surplus cereal straw from this year's harvest. If only half the straw available can be made into farmyard manure the land will benefit to the extent of at least 15,000,000 tons of this valuable plant food and soil improver.

The best farmyard manure is, no doubt, made in a covered yard, but in present circumstances, where large quantities of straw require to be rotted, other methods should be tried. Half open or entirely open yards will absorb larger quantities of straw. In the chief arable districts there is room for an extension of the open system practised in Lincolnshire. A temporary yard, entirely open, is made in a corner of an arable field where straw is stacked. The stacks provide shelter from cold winds and at the same time supply the litter for the yard. At the end of the winter the manure, conveniently on the spot, is spread over the field. Good sheltered yards can also be made with bales of straw.

Straw may be scattered on the root field when sheep are being folded or used for foddering store cattle running out in the winter, or for cows on the bail system. When, however, large quantities of straw can be only partly rotted, extra sulphate of ammonia must be added to the crop to compensate for the poorness of the manure and to assist rotting in the soil. Alternatively, sulphate of ammonia may be added in the heavily littered open yard during the making.

All possibe ways and means of getting straw returned to the land must be considered, so that its fertility will not be impaired by the intensive cropping imposed by war conditions. Where ricks have been scattered about the farm for security reasons, it may sometimes be worth while to thresh and build the straw rick near the yard, thus avoiding having to cart straw from a distance in the winter.

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Haphazard Feeding to Stock Should be Avoided.—There is often considerabie waste in the feeding of livestock. Attempts are often made, for instance, to achieve the impossible by giving excessive amounts of low-grade materials to compensate for a lack of cakes and meals. Cereal grain is expected to take the whole place in the production ration, which it can never do. Peas or beans are needed to effect a balance.

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The Extra "Handful" is Wasteful.—Some cowmen have a way of giving their charges an extra handful or two of oats, beans or other concentrates, and of being lavish with the roots and roughage when the master's back is turned. The stock will eagerly eat all they get, but the extra food does no good. If the rations have been carefully calculated according to the maintenance and production requirements of each animal, it is sheer waste to give them more. It will not make the cow yield a pint more milk.

A good plan is to chalk up on a board over each stall the exact ration to be fed and then make sure that each animal gets its quota (and no more) by an occasional check on the cowman. Concentrates must be accurately measured, and roughage should be weighed every now and then to keep the amounts fed within reasonable limits. Enough can often be saved in this way to enable one or more cows to be added to the average herd.

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Rat Catching: War Work for Dogs.—Threshing operations offer every facility for training dogs to catch rats. There are 2,000,000 dogs in this country and if only 10 per cent. could be employed in killing these pests they would be doing the nation a great service. A dog that is a rat killer by instinct is noticeable immediately he gets their scent. Other dogs have to be encouraged by example. In nine cases out of ten they will be stimulated to follow suit by the sight of a good ratter at work. If a dog is somewhat shy of rats, he should not be allowed to tackle fully-grown rodents during his training stage.

The terrier class is as a whole easily the best ratter, but many other dogs, even those that give rise to such superior canine jibes as "How are your fathers?" can be trained as first-class ratters. Chows can develop into exceptionally good killers, and in one army camp the prize killer was a chow bitch—she never missed a rat and killed at one snap.

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What Beet-top Silage Saves.—If sugar-beet tops cannot be fed fresh, they should be made into silage for winter feeding. Only where a farmer has no livestock can there be any justification for ploughing under. Ensiling is done in a simple clamp and no molasses is needed. The product is of such feeding value that 13 lb. will replace either 22 lb. mangolds, 18 lb. swedes, 4½ lb. meadow hay, 7½ lb. oat straw, or 2¼ lb. oats.

Farmers who have little hay or roots will find a ration of 40 lb. beet-top silage and 9 lb. hay perfectly satisfactory for the maintenance of an 11 cwt. cow, thus saving about 16 cwt. of hay per head over the stall-feeding period. With plenty of hay but no roots, 13 lb. silage and 19 lb. hay will suffice, or, with some hay and some roots, 26 lb. silage, 22 lb. mangolds and 9 lb. hay. Beet-top silage should be fed to dairy cows out of doors after milking, and always with some hay. It is also an excellent food for young and fattening cattle.

What's in a Name?—The purists are not satisfied that a good Welsh equivalent can be found for the word "silage." A recent competition brought in nearly 100 suggestions of which "silwair," a word already used up North, was adjudged the best. "Silwar Melys," meaning molassed silage, has also been put forward. Silage by any name (if properly made) would eat as sweet, and at the present time concentration should be given to making rather than naming.

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Using Marrow-stem Kale.—Unless marrow-stem kale is eaten down before Christmas the crop will become fibrous and lose in feeding value, so that more concentrates have to be fed in the ration. Moreover, the crop may lose up to one-third of its weight

between the end of October and the end of January if left standing, and it becomes increasingly more difficult to cut.

Farmers who have more kale than their stock can consume before the new year are advised to cut any surplus when the foliage is at its best, and make it into silage for feeding in the New Year. Each 28 lb. of the silage will produce a gallon of milk, at which rate of feeding a single acre of kale yielding 25 tons will provide as much milk-producing food as four acres of beans or clover hay or six acres of pasture.

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Problem Solved by British Farmer.—A problem that has baffled agricultural scientists and practical farmers in this and every other country has been solved by Mr. J. R. Tinney, of Church End Farm, Rickling, Essex. As a contribution to the war effort Mr. Tinney has made public his discovery of a specific rotation and cultivation technique to clear the land of wild onions. This weed renders wheat flour unsuitable for bread-making and makes milk unfit for domestic use if the cows have fed from tainted leys.

The essential features of Mr. Tinney's cropping scheme are, first, a succession of spring sown crops for a period of six years, and, second, the omission of such crops as autumn sown wheat, beans, clover and bare fallow. No attempt is made to "pull" the onions, and their absence is never assumed until the six years' programme has been completed. The rotation used is: Potatoes or beet sugar—spring wheat—sugar beet or potatoes—barley—spring green crops (peas, kale, cabbage, silage)—spring corn. No ploughing is done in September or October. Wet land is mole-drained before any eradication is attempted.

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Minerals and Vitamins Needed for Proper Growth in Poultry.—Small amounts of cod liver oil are usually added to chick mashes to prevent rickets. If "leg weakness" appears in spite of this addition the oil is usually blamed. But a lack of mineral matter may be the cause.

Foods normally used for chick feeding are relatively rich in phosphorus but low in calcium. Thus, if signs of rickets appear the first step should be to add 1 lb. of ground chalk or limestone flour to every cwt. of mash, or allow the chicks free access to limestone grit. If the trouble persists, then, and then only, should the oil be suspected.

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Grey squirrels are nothing but rats and as rats they must be exterminated. The damage they do to fruit trees and conifers is enormous. The grey squirrel is a pest that must be shot on sight. On one Sussex estate where damage has been done to wheat, 150 were shot in four days.

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Each acre of good pasture yields about three tons of silage per cut—more if top-dressed.

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To get a good aftermath top-dress with 1-1½ cwt. per acre of sulphate of ammonia as soon as hay is off.

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Remember silage can be made in a pit or clamp. Advice can be had from the silage officers of County War Agricultural Committees.

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ANIMAL TRANSPORT COMPANIES

The Times Special Correspondent with the Army, in a recent message from the Southern Command, deals with the continuing value of horses and mules in the transport of material in every Allied theatre of operations. He writes: "When the Highland Division was forward of the Maginot forts on the Saar front mules were used for transporting material into the outpost line. Later in 1940 it had been planned that the Indian mule transport companies in France should be ready to go to Norway if that country were invaded, but the French undertook to send their own companies. Again, the successful British campaigns in Abyssinia and Eritrea were often dependent on mules and pack-horses for transport in the mountainous country, just as were the German divisions that dashed across Greece. And in the Middle East to-day there is still a useful place for the several animal transport companies—British, Indian, and Cypriot—employed there.

"Here, at home, a Transport (Animal) Training Company forms part of the Training Brigade of the Royal Army Service Corps in this Command, and men are posted from it to the animal transport companies at present stationed in the mountains of Scotland. To-day the pack-horse fulfils the principal function of animal transport, but when a man leaves this training company he has become skilled in most branches of horsemanship. The best recruits for this service are the former drivers of horse artillery, many of whom have volunteered, and next to them might be placed milk roundsmen and men experienced in that type of work. Lads from the superior racing stables seldom take kindly to the inferior task of pack-horse transports and farm labourers seem also to have no flair for it, though both are useful for some of the auxiliary work connected with the company.

"At these training quarters, for instance, the excellent condition of the horses and their stables is a sure sign of the type of man selected to look after them. Here the horses in use are a quiet, mixed bunch of hunters, coach horses, chargers, and so on, but for active service mountain ponies from Scotland and Wales are sought. The maximum load of the pack-horse is about 240 lb., and in the field the small A.T. cart would be used until pack-loading became necessary, when the cart can be used as a dump.

"It had been thought at first that the very limited number of pack-horse companies in the Army could be manned with recruits of comparatively low physique. But it was soon realised that for man, as well as horse, this is very arduous work, demanding strength and stamina. The man, for instance, must be as fit in the feet as any infantry soldier and able to endure long stretches of trudging along mountain paths. He has also to be an alert and resourceful fighting soldier."

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The Minister of Agriculture, Mr. R. S. Hudson, has appointed Dr. Dudley Stamp to be his adviser on rural land utilisation. Dr. Stamp is director of the Land Utilisation Survey of Great Britain and was Vice-Chairman of the Scott Committee on the utilisation of land in rural areas.

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Concentrator plant for the treatment of swill is being established near military camps in the Southern Command, it is announced by the National Farmers' Union. It is intended to set up such plant at military camps all over the country.

No case of foot-and-mouth disease has been traced to swill from concentrator plants.

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Five years ago, a Morayshire crofter bought for £10 a pony which had served its former owner well and was becoming too old for the job. A few weeks ago, he sold it for £28. As the buyer was a dealer, the price may be expected to go still higher. We have heard of instances where horses in dealers' hands have become younger.—*Scottish Farmer.*

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The fundamental economic policy to be followed must be the provision of food in satisfactory quantities and qualities for the whole of the world's people.—*Sir John Orr.*

DISEASES OF ANIMALS ACTS, 1894 TO 1937, AND AGRICULTURE ACT, 1937 (PART IV).

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period	Anthrax	Foot-and-mouth	Parasitic Mange*	Sheep Scab	Swine Fever
Sept. 1st to 15th, 1942	10	98	—	7	31
Corresponding period in—					
1941 ...	11	—	—	6	28
1940 ...	13	—	—	3	246
1939 ...	16	4	1	1	153
Total Jan. 1st to Sept. 15, 1942	236	445	26	130	329
Corresponding period in—					
1941 ...	320	258	15	150	938
1940 ...	380	24	15	129	3,226
1939 ...	563	67	32	167	1,734

NOTE.—The figures for the current year are approximate only.
*Excluding outbreaks in Army Horses.